CLAIMS:

What is claimed is:

1 1.   An apparatus comprising:

2   a main memory for storing data;

3   one or more I/O devices for receiving data from or sending

4 data to said main memory;

5   a control unit for controlling said I/O devices;

6   an I/O processor (IOP) for controlling I/O operations for

7 sending data between said main memory and said I/O devices;

8   disparate channels between said IOP and said control unit,

9 said disparate channels including multiple channel paths for

10 carrying data between said main memory and said I/O devices

11 during said I/O operations; and

12   a computer program executed by said IOP for assigning a path

13 weight to selected ones of said channel paths whereby the next

14 channel path to carry data between said main memory and said I/O

15 devices is selected.

1 2.   The apparatus of claim 1 wherein said disparate channels

2 includes more than one type of channels.

1 3.   The apparatus of claim 1 wherein said disparate channels

2 comprises one or more channel types including ESCON channels,

3 FICON bridge (FCV) channels, or FICON Native (FC) channels.

1 4.   The apparatus of claim 2 wherein said computer program

2 includes an algorithm for assigning a path weight to a channel

3 path candidate dependent upon the type of channel containing the

4 channel path candidate.

1   5.   The apparatus of claim 4 wherein the next channel path
2   candidate is selected by a round robin algorithm.

1   6.   The apparatus of claim 4 comprising channel busy data (CBD)
2   stored by each channel for containing the status of channel
3   paths in the respective channel, and an IOP copy of said CBDs
4   stored by said IOP, and said computer program includes an
5   algorithm for using data in said CBDs for assigning a path weight
6   to a channel path candidate.

1   7.   The apparatus of claim 6 wherein said computer program
2   classes a channel path candidate as a great candidate, a bad
3   candidate, or an OK candidate dependent on the value of the given
4   channel path's path weight value, said computer program further
5   including an algorithm for selecting the channel path candidate
6   to initiate the I/O operation on if it is classed as a great
7   candidate, evaluating the next candidate if it is classed as an
8   OK channel path or a bad channel path, or selecting the OK
9   candidate with the least path weight to initiate the I/O
10   operation on if there are no great candidates found while
11   rejecting any bad candidates.

1   8.   The apparatus of claim 7 further comprising multiple IOPs,
2   each channel path having an affinity to one IOP, a work queue
3   having work elements for each IOP, and said computer program
4   comprises a loop for determining the best class of available
5   candidates, and from that class picking the candidate that has
6   affinity to the IOP with the least number of work elements on its
7   work queue.

1   9.   A data processing system having a main memory for storing
2   data, one or more I/O devices for receiving data from or sending
3   data to said main memory, and an I/O processor (IOP) for

4   controlling I/O operations for sending data between said main
5   memory and said I/O devices, an apparatus for selecting paths
6   between the main memory and the I/O devices comprising:
7   disparate channels between the IOP and the I/O devices, said
8   disparate channels including multiple channel paths for carrying
9   data between the main memory and the I/O devices during the I/O
10 operations; and
11   a computer program executed by said IOP for assigning a path
12 weight to selected ones of said channel paths whereby the next
13 channel path to carry data between said main memory and said I/O
14 devices is selected.

1   10.   The apparatus of claim 9 wherein said disparate channels
2   includes more than one type of channels.

1   11.   The apparatus of claim 9 wherein said disparate channels
2   comprises one or more channel types including ESCON channels,
3   FICON bridge (FCV) channels, or FICON Native (FC) channels.

1   12.   The apparatus of claim 10 wherein said computer program
2   includes an algorithm for assigning a path weight to a channel
3   path candidate dependent upon the type of channel containing the
4   channel path candidate.

1   13.   The apparatus of claim 12 wherein the next channel path
2   candidate is selected by a round robin algorithm.

1   14.   The apparatus of claim 12 comprising channel busy data (CBD)
2   stored by each channel for containing the status of channel
3   paths in the respective channel, and an IOP copy of said CBDs
4   stored by said IOP, and said computer program includes an
5   algorithm for using data in said CBDs for assigning a path weight
6   to a channel path candidate.

1   15. The apparatus of claim 14 wherein said computer program
2   classes a channel path candidate as a great candidate, a bad
3   candidate, or an OK candidate dependent on the value of the given
4   channel path's path weight value, said computer program further
5   including an algorithm for selecting the channel path candidate
6   to initiate the I/O operation on if it is classed as a great
7   candidate, evaluating the next candidate if it is classed as an
8   OK channel path or a bad channel path, or selecting the OK
9   candidate with the least path weight to initiate the I/O
10 operation on if there are no great candidates found while
11 rejecting any bad candidates.

1   16. The apparatus of claim 15 further comprising multiple IOPs,
2   each channel path having an affinity to one IOP, a work queue
3   having work elements for each IOP, and said computer program
4   comprises a loop for determining the best class of available
5   candidates, and from that class picking the candidate that has
6   affinity to the IOP with the least number of work elements on its
7   work queue.

1   17. A method for selecting channel paths in a data processing
2   system having a main memory for storing data, one or more I/O
3   devices for receiving data from or sending data to said main
4   memory, an I/O processor (IOP) for controlling I/O operations for
5   sending data between said main memory and said I/O devices, and
6   disparate channels between the IOP and the I/O devices, said
7   disparate channels including multiple channel paths for carrying
8   data between the main memory and the I/O devices during the I/O
9   operations, said method comprising:
10   assigning a path weight to selected ones of said channel
11 paths; and

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12   selecting the next channel path to carry data between said
13   main memory and said I/O devices based on said path weight.

1   18.   The method of claim 17 comprising including more than one
2   type of channel within said disparate channels.

1   19.   The method of claim 17 further comprising including within
2   said disparate channels, one or more channel types including
3   ESCON channels, FICON bridge (FCV) channels, or FICON Native (FC)
4   channels.

1   20.   The method of claim 18 further comprising assigning a path
2   weight to a channel path candidate dependent upon the type of
3   channel containing the channel path candidate.

1   21.   The method of claim 20 further comprising selecting the next
2   channel path candidate by a round robin algorithm.

1   22.   The method of claim 18 comprising storing channel busy data
2   (CBD) by each channel, said CBD containing the status of channel
3   paths in the respective channel, and storing by said IOP, an IOP
4   copy of said CBDs, and said using data in said CBDs for assigning
5   a path weight to a channel path candidate.

1   23.   The method of claim 22 further comprising:
2   classifying a channel path candidate as a great candidate, a
3   bad candidate, or an OK candidate dependent on the value of the
4   given channel path's path weight value; and
5   selecting the channel path candidate to initiate the I/O
6   operation on if it is classed as a great candidate, evaluating
7   the next candidate if it is classed as an OK channel path or a
8   bad channel path, or selecting the OK candidate with the least

9   path weight to initiate the I/O operation on if there are no
10 great candidates found while rejecting any bad candidates.

1   24. The method of claim 23 wherein said data processing system
2   includes multiple IOPs, each channel path having an affinity to
3   one IOP, a work queue having work elements for each IOP, and said
4   method further comprises:
5   performing a loop for determining the best class of
6   available candidates; and
7   from that class, picking the candidate that has affinity to
8   the IOP with the least number of work elements on its work queue.

1   25. A program product usable with in a data processing system
2   having a main memory for storing data, one or more I/O devices
3   for receiving data from or sending data to said main memory, an
4   I/O processor (IOP) for controlling I/O operations for sending
5   data between said main memory and said I/O devices, and disparate
6   channels between the IOP and the I/O devices, said disparate
7   channels including multiple channel paths for carrying data
8   between the main memory and the I/O devices during the I/O
9   operations, said program product comprising:
10   A computer readable medium having recorded thereon computer
11 readable program code means for performing the method comprising:
12   assigning a path weight to selected ones of said channel
13 paths; and
14   selecting the next channel path to carry data between said
15 main memory and said I/O devices based on said path weight.

1   26. The program product of claim 25 wherein said method
2   comprises including one or more type of channel within said
3   disparate channels.

1   27.   The program product of claim 25 wherein said method further
2   comprises including within said disparate channels, one or more
3   channel types including ESCON channels, FICON bridge (FCV)
4   channels, or FICON Native (FC) channels.

1   28.   The program product of claim 26 wherein said method further
2   comprises assigning a path weight to a channel path candidate
3   dependent upon the type of channel containing the channel path
4   candidate.

1   29.   The program product of claim 28 wherein said method further
2   comprises selecting the next channel path candidate by a round
3   robin algorithm.

1   30.   The program product of claim 26 wherein said method
2   comprises storing channel busy data (CBD) by each channel, said
3   CBD containing the status of channel paths in the respective
4   channel, and storing by said IOP, an IOP copy of said CBDs, and
5   said using data in said CBDs for assigning a path weight to a
6   channel path candidate.

1   31.   The program product of claim 30 wherein said method further
2   comprises:
3   classifying a channel path candidate as a great candidate, a
4   bad candidate, or an OK candidate dependent on the value of the
5   given channel path's path weight value; and
6   selecting the channel path candidate to initiate the I/O
7   operation on if it is classed as a great candidate, evaluating
8   the next candidate if it is classed as an OK channel path or a
9   bad channel path, or selecting the OK candidate with the least
10   path weight to initiate the I/O operation on if there are no
11   great candidates found while rejecting any bad candidates.

1   32.   The program product of claim 31 wherein said data processing

2   system includes multiple IOPs, each channel path having an

3   affinity to one IOP, a work queue having work elements for each

4   IOP, and said method further comprises:

5   performing a loop for determining the best class of

6   available candidates; and

7   from that class, picking the candidate that has affinity to

8   the IOP with the least number of work elements on its work queue.